

U₂Ru₂Sn: a low carrier density system

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We present magnetic susceptibility $\chi(T)$, electrical resistivity $\rho(T)$, magnetoresistance $MR(H, T)$, Hall coefficient $R_H(H, T)$, thermal conductivity $\kappa(T)$, thermopower $S(T)$, and specific heat $C_p(T)$ data for U₂Ru₂Sn. $\chi(T)$ exhibits a broad maximum at $T_{max} = 165$ K, suggesting moment compensation at low temperatures. $\rho(T)$ also shows a broad maximum but at a lower temperature of 125 K. This temperature concurs with a maximum in the p -type $S(T)$ dependence. $R_H(T)$ is temperature dependent with a sign change from negative to positive at 50 K. Within a two-band model, both the electron and the hole concentrations drop drastically below 150 K, reaching concentrations of the order of 10^{19} cm^{-3} at 2 K. This indicates that an energy gap of the order of 100 K opens. Moreover, the large and positive MR of 22 % at 2 K and in 130 kOe suggests that the center of the gap locates slightly above the Fermi energy. These observed physical properties show many similarities to those reported for known Kondo insulators. Further investigations which can confirm the gapped state in U₂Ru₂Sn, notably ¹¹⁹Sn NMR, are currently under progress.

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